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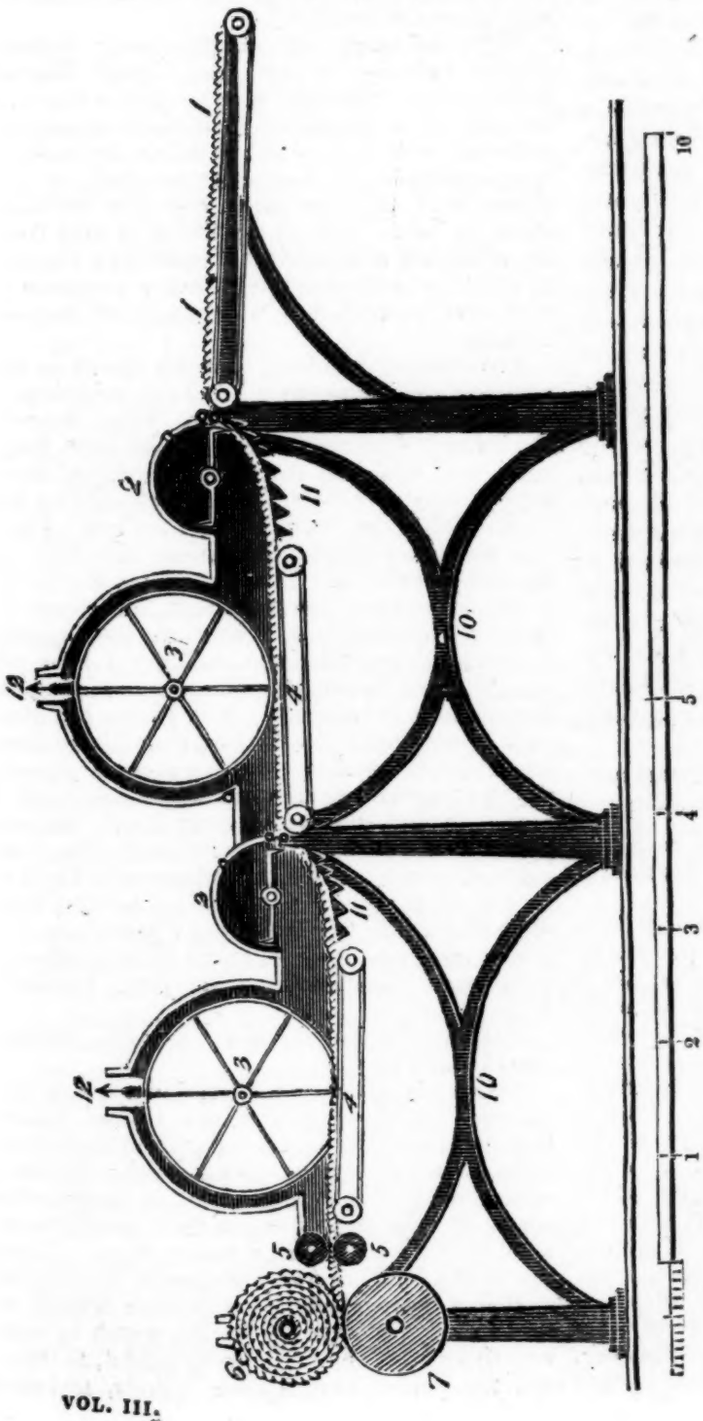
"He who does his best, however little, is always to be distinguished from him who does nothing."—DR. JOHNSON.

View of a Cotton Scutching and Lapping Engine, on the most improved plan, the first one invented, by N. SNODGRASS, ***of Glasgow, in*** 1806. [Communicated by the Inventor for the Mechanics' Magazine and Register of Inventions and Improvements.]



EXPLANATION.

1, 1, Feeding table, with cotton weighed and spread upon it.
2, 2, Scutcher cylinders, 11 inches diameter, to run 1500 revolutions per minute, with covers of iron.
3, 3, Wire gauze cylinders, with covers, to spread the cotton, and let off the air generated by the scutcher cylinders.
4, 4, Feeding cloths and moving wooden rollers, to carry the cotton under the wire cylinders from scutcher to scutcher.
5, 5, Two cast iron rollers, 4 inches diameter, to compress the cotton before it is lapped up on roller No. 6, for the cards.
6, Cotton roller, for the carding engine.
7, An iron or wooden cylinder, about 15 inches diameter, under cotton roller, for winding up the same.
10, 10, A view of one side of the cast iron framing.
11, 11, Triangle ribbed hecks, for extracting the gins, &c. from the cotton, and allowed in Europe to be an important part of the scutching engine.
12, 12, Air apertures, for letting the generated air escape through the gauze wire covered cylinders.
~~~~~~~~~~~~~~~~ This represents the cotton in process.

New-York, May 14, 1834.

TO THE EDITOR:

Sir,—A few weeks ago I took the liberty of sending you a plan (not mine) for blasting iron ore furnaces with hot air,* successfully in use in Scotland, whereby thirty-three per cent. of fuel is said to be saved; also, a plan of mine for heating factories on the best principles, by steam; in hopes these might benefit this rising country. From the same motive, I again send you another plan of a scutching (batting) machine, for opening, cleaning, and, in one operation, preparing it to be applied to the carding engines; the first one invented by me, in Messrs. G. Houston & Co.'s large

* Which will be inserted shortly.—[ED. M. M.]
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spinning factories in the town of Johnstone, Scotland, in 1806, and successfully introduced to the spinning trade in Britain, and, *I believe*, never before in any publication.

The section plan annexed is drawn on a necessarily small scale, to suit the limits of magazines, and is only calculated to suit the understanding of the first rate cotton machine makers, such as Mr. Rodgers, &c. at Paterson. The plan shows all the essential working parts: the various complicated movements, &c. will be easily arranged by these gentlemen, and almost impossible to be exhibited in yours, or any other similar publication. All that I have to observe, in addition to the explanation accompanying the drawing, for the practical working of the machine, in cotton factories, is, that this machine should be made the same breadth of the carding engines, so that the finished lap, No. 6, would suit on applying it. Also, the first feeding cloth, Nos. 1, 1, should be divided into such parts as the manager of the work may think proper, then causing the person that attends the machine to weigh a certain weight of cotton, and carefully spread that weight on each of these parts, which has the effect of enabling the small scutching cylinders to open the cotton more regularly; and, finally, finish the lap, for carding, in the most perfect manner, doing as much work, and better, with one person, than if more were employed, which is the case with those cotton factories I have been permitted to examine in this country. Also, from twenty-eight years' experience, I decidedly recommend, in no case, to make the scutcher cylinders more than *twelve* inches in diameter, and only with two blades. In the mean time, I am, Sir, yours, &c.,

NEIL SNODGRASS, 87 Pearl st.

Information to Inventors who wish to obtain Patents in England. [From the Journal of the Franklin Institute.]

Inquiries are frequently made of the Editor, by persons who wish to secure patents in England and France for their inventions, and it has been his design to give some general information upon that subject in the Journal. The present article, however, is not considered as fulfilling his intention, but merely as bringing to notice one point of considerable importance in the business. The patent law of the United States provides for the granting of patents to inventors, only, or to their heirs, administrators, or assignees; and a patent obtained by any other person is invalid. In England, patents are granted for what is *new there*, without regard to who was the inventor of it; if invented in a foreign country, the term new applying to its novelty in the realm. Whoever, therefore, first takes a new invention to that country can obtain a patent, and defend his right. It consequently becomes a point of great importance, that those inventions which are deemed worth the expense of an English patent should not be divulged here before steps have been taken to secure the right on the other side of the Atlantic.

The Editor has, in several instances, prepared and transmitted the requisite papers to England, his situation being such as to offer special facilities for so doing. Owing to this, and to his general pursuits, he has become the depository of more information respecting the modes of procedure than has fallen to the lot of most other persons; his connection with the Patent Office of the United States also brought to his notice many things calculated to throw light upon this subject.

There are many persons who make it their special business to visit the United States' Patent Office, that they may be able to turn the inventions of others to their own advantage, either at home or abroad: at home, by making some unimportant change in the form of machines that they see there, and then diffusing them in some part of the Union remote from the residence of the original inventor; abroad, by sending to England and France accounts of such inventions as they believe will sell in those countries.

This subject has been brought afresh to the notice of the Editor by a letter received from a correspondent in New-York, Wm. Serrell, Esq., Civil Engineer, a gentleman from England, and who was frequently employed there in preparing specifications and drawings for the Patent Office, and who has, in several instances, been engaged by American inventors in the same business. In a letter dated March 3d, in which he mentions this fact, he observes, that, "The short period since my first agency of this kind, and the little publicity I have yet sought, are reasons why the number of these transactions is yet small; still, I have the pleasure to say that late arrivals bring advice from my friend in London, that two of such patents are in progress towards profitable sale; but I regret to add, the same letter states that one patent is likely to be interfered with, if not set aside, through some circumstances that will be fully understood by the annexed extract from the letter itself, which extract I hand you, believing that you may consider it of sufficient importance for insertion in your excellent Journal."

Extract of a letter dated "London, December 14, 1833":

"It may be of use to apprize inventors of mechanical improvements in the United States, that it is essential to the security of their interests, if they design to take out patents for their inventions in this country, not to disclose the secret of their inventions in the United States, until they have secured a patent here. There are many ingenious mechanics in the United States in correspondence with their friends in this country, constantly on the watch to seize any thing new, and likely to be useful, to transmit the particulars to their friends, and thus

forestal the rights and interests of the original inventor."

As a commentary upon the foregoing extract, the following fact may be stated. An American had obtained a patent in the United States, and had assigned the right thereto, in England, to a fellow-citizen for twenty thousand dollars; the assignee, however, arrived there too late, as some one had obtained the description from the office here, transmitted it, and obtained a patent.

There is now before the British Parliament a new law to regulate the granting of patents. It passed the House of Commons at the last session, and was read a second time in the House of Lords, but the Lord Chancellor wishing to examine its details with more care than was then possible, it was postponed. It will undoubtedly be completed at an early period, when we shall give its provisions, with such other matter respecting foreign patents as may appear to us important.

Further notice respecting the obtaining of Patents in England.—The Editor has just received a further communication from W. Serrell, Esq., Engineer, New-York, the gentleman referred to in the first article in the present number, in which he has furnished another extract from a letter on the subject of English patents, dated London, 17th February, 1834. As it not only confirms, but gives additional importance to the observations made in the above named article, we hasten to publish it.

"By the way, a man has recently arrived from New-York, named S———, loaded with patents, none of which are his own; amongst them he has got J. R——'s, with the specification and drawings. R—— knows him, and S—— was much surprised to find R—— here, and still more that his patent was secured.

"This is another practical evidence of the importance of the caution which I lately sent to you, and which I hope you have had published. The moment a patent worth any thing is taken out at Washington, one of these kidnappers secures the child as his own, and goes away with it to a foreign market. A patent was recently named to an English tradesman, who directly asked if it was not an American invention; on being answered in the affirmative, he rejoined 'you are too late, my brother saw it in N. York, and when he came home had one made.' The plain result of all this is, that when any thing is invented in America which is deemed worthy of being patented in England, it ought to be secured, but not published in America, until time has been given to secure it in England. You may be assured that there are regular traders, or rather regular plunderers of patents, persons who make this a business, and do nothing else. I could furnish some proofs of the fact."

Mr. Serrell adds, "the first part of the above refers to a patent for an improvement, the inventor of which went hence by my advice, and applied to my friend in London, by whom he has been placed in a situation to obtain a handsome remuneration, all of which would have been jeopardized had S—— left New-York a few weeks earlier. Any unprincipled man, with a small amount of mechanical knowledge, can, by swearing to 'a communication from a foreigner residing abroad,' obtain a patent, unless he is met on the threshold by an opposition which will compel him to show the nature of the communication under which he attempts to procure it.

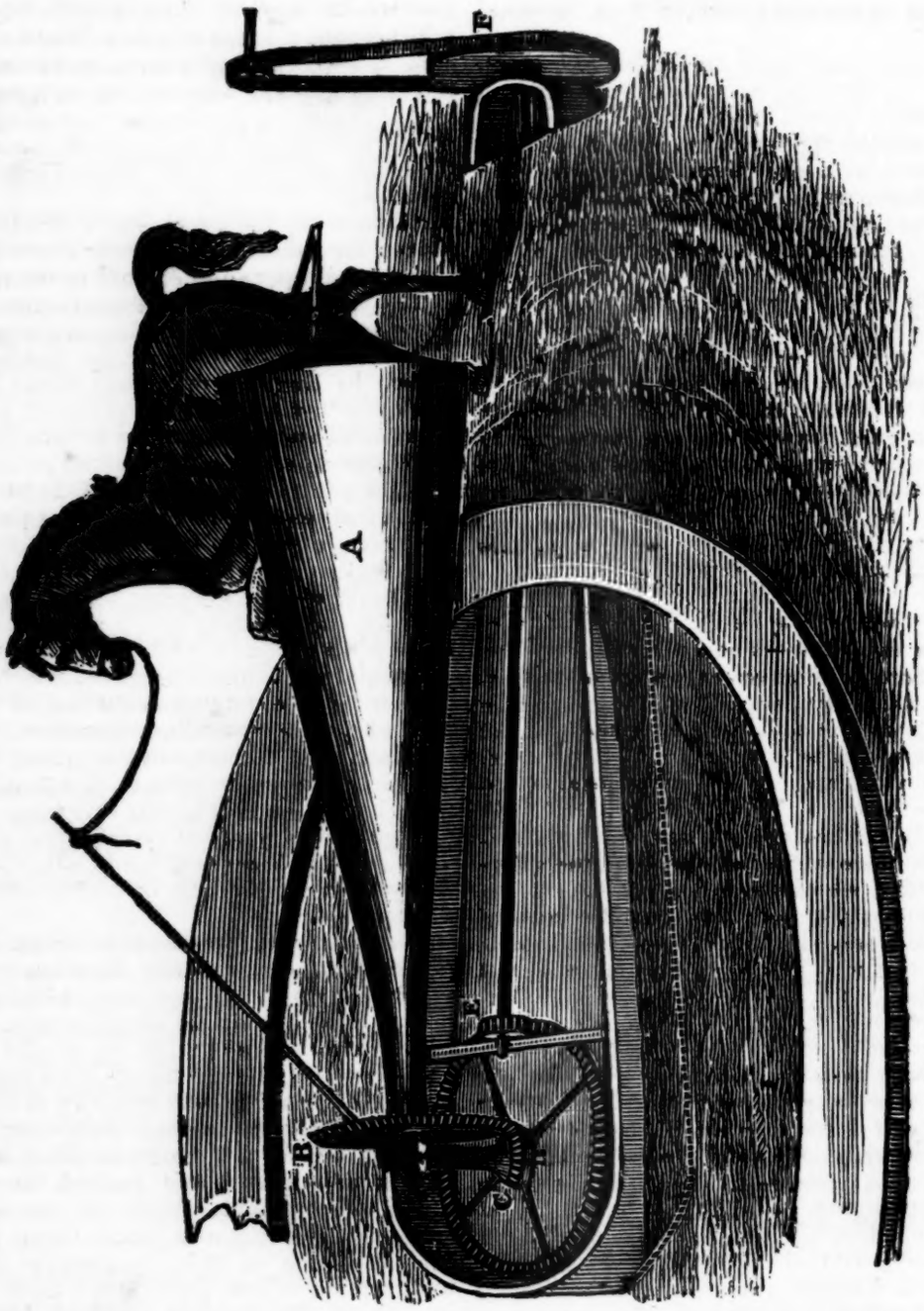
"I forward the preceding extracts and remarks for publication in your Journal, should you think proper so to dispose of them."

The writer of the letter from England probably is not aware of the difference between the practice here and there in the issuing of patents. In England the patent issues upon the title of the invention being furnished, and several months are allowed, most commonly six, for the enrolling of the specification, so that no individual can learn the nature of the invention at the patent office for this length of time after it has been *secured*. In the United States the specification must be furnished before the patent can issue, and the very day that a patentee receives it, any one may obtain a copy of it. The office has no power whatever to refuse such a copy, and no blame, therefore, attaches there, this being the fair construction of the law. The only safe procedure, therefore, when an inventor wishes to secure a patent in England, is to send over, prior to, or simultaneously with, his application here, furnishing to a proper agent, a copy of his specification and drawings, and the necessary funds, otherwise he is likely to be superseded, in which case he has no remedy.

There are but few cases, however, in which an inventor ought to rely upon his own judgment respecting the propriety of obtaining a patent in England; he should obtain the best advice here, and after this be careful that the business goes into the hands of an agent there who has the ability and integrity to direct him aright. An English patent costs about six hundred dollars, for that kingdom alone, and if extended to Scotland and Ireland, about three times that amount. Were all inventions as good as their authors think them, this sum would be one of little comparative moment; but, in point of fact, there is not more than one in fifty of the patents obtained here which would be worth patenting in England, at so great a cost, although what is really new and useful will, in general, be better paid for there than with us.

Industry.—Those who have been trained to habits of industry enjoy life more than those that are indolent. The former are always seeking something to do; the latter are restless, work not being pleasant, and rest not being truly relished. The life of an inactive lazy man is unseasoned, very insipid, and unpalatable.

Economy.—He who saves in one way, that he may enjoy his savings in a more rational one, is the true philosopher: he will do good while living, and be remembered with respect when dead.



Description and Drawing of Beecher's Portable Horse Power. Communicated by the INVENTOR.

This power is applicable to all purposes where speed is necessary, particularly to thrashing, grinding, turning, and sawing. Its superiority consists in the simplicity of the gear: only two wheels of 23 and 30 inches, with pinions of 9 and 6 inches, are necessary to get a speed of two to three hundred revolutions per minute. The power being obtained by a revolving lever on a smooth surface, it is not liable to break by sudden impetus, or stoppage. It requires no frame or building, but is simply fastened to the ground or floor. The lever may be increased in length without diminishing the speed. It may be removed and erected in three hours' time. It can be placed in a back yard or cellar, and it makes no jarring in the building.

REFERENCES.—A, revolving lever ; B, driving wheel ; C, nine-inch pinions; E, line shaft ; and F, band wheel.

This horse power may be seen in the yard of the Railroad House, 98 Barclay street, New-York. The right to territory may be obtained of the inventor at the above place. Machines of one, two, three, or four horse power furnished to order at 60, 75, 90, and 100 dollars.

A portable cider mill and press to be seen as above.

History of Astronomy—its various Systems, &c. [Continued from page 231.]

Of the Fixed Stars.—The fixed stars are considered by astronomers as forming no part of the solar system, but as placed far beyond the utmost limits of it. They have supposed that each star is a sun, having a number of planets and comets circulating round it, and that each of the planets thus circulating round those luminaries may be a habitable world like our own.

The strongest argument for this hypothesis is, that fixed stars cannot be magnified by the most powerful telescopes, on account of their extreme distance. Hence it is concluded, that they shine by their *own* light; and that each of them is a sun, equal, if not superior, in lustre and magnitude to our own.

When the stars are examined through a telescope, they rather seem diminished than increased in size. This circumstance alone would have been a striking proof of the immeasurable distance of these bodies, had we not been in possession of still more convincing evidence. In every attempt which astronomers have made with the best of instruments to discover the *parallax* of the stars, they never found it to amount to *one* second, even when the earth was in opposite points of her orbit; and therefore they have determined that the nearest of these luminaries cannot be less than 206,265 times the radius of the earth's orbit. As light traverses the latter in 8′ 13″, it will require 3 years and 79 days to come from a fixed star to the earth. And it is believed some of them may be so remote that their light has not yet reached the earth since they were created; while others, which have disappeared, or have been destroyed many ages ago, may continue to shine in the heavens till the last ray which they emitted has reached our globe.

The number of stars discoverable at any time in the heavens, by the naked eye, is not above a thousand. This may at first appear incredible to some, because they seem to be innumerable; but the deception arises from looking upon them hastily, without reducing them into any kind of order. For let any person look steadily a little time upon a large portion of the heavens, and count the number of the stars in it, and he will be surprised to find the number so small. And if the moon be observed for a short space of time, she will be found to meet with very few in her way, although there are as many about her path as in any other part of the heavens.

Flamstead's catalogue of the stars in both hemispheres contains only 3000; and a great number of these cannot be seen without the assistance of a telescope. When the heavens are examined with a good telescope, the stars are not found to be uniformly scattered over the firmament. In some places they are crowded together; and in other parts there are large spaces where no stars can be seen. Besides these starry groups, where the individual stars are distinctly visible, there are numbers of small luminous spots, of a cloudy appearance, called *Nebulæ*. The largest of these nebulæ is the galaxy, or milky way, a white luminous zone which nearly encircles the heavens, and which appears to be the nearest of all the nebulæ.

While the heavens exhibit these appearances, which may be termed *constant*, they occasionally exhibit others of a different kind, which seem to arise from some great physical changes that are going on in the universe. Several new stars have appeared for a time, and then vanished; some that are inserted in the ancient catalogues can no longer be found, while others are constantly and distinctly visible, which have not been described by any of the ancients. Some have gradually increased in lustre; others have been gradually diminishing; and a great number sustain a *periodical* variation in their brilliancy.

In order to explain these singular changes, astronomers have supposed that the stars are suns, having part of their surface occupied by large black spots, which, in the course of their rotation about an axis, present themselves to us, and thus diminish the brilliancy of the star. Some astronomers suppose the black spots to be permanent; but others are of opinion that the luminous surface of these bodies is subject to perpetual change, which sometimes increases their light, and at others extinguishes it.

The stars are divided into orders or classes, according to their apparent magnitudes. Those that appear largest to the naked eye have been called stars of the first magnitude; those that appear next largest, the second magnitude; and so on to the sixth, which comprehends the smallest stars that are visible to the naked eye. All those that can only be perceived by the help of a telescope are called telescopic stars.

The stars of each class are not all of the *same* apparent magnitude. In the first class, or those of the first magnitude, there are scarcely two that appear of the same size.

There are also other stars of intermediate magnitudes, which astronomers cannot refer to any particular class, and therefore they place them between two; but on this

subject astronomers differ considerably: some of them classing a star among those of the first magnitude, while others class it among those of the second, and so on with others.

In fact, it may be said that there are almost as many orders of stars as there are stars, on account of the great varieties observable in their magnitude, color, brightness, &c. Whether these variations of appearance are owing to a diversity in their real magnitudes, or from their different distances, it is impossible to determine; but it is highly probable that both of these causes contribute to produce these effects.

To the naked eye the stars appear of a sensible magnitude, owing to the glare of light arising from the numberless reflections from the aerial particles, &c. about the eye. This makes us imagine the stars to be much larger than they would appear if we saw them only by the few rays which come directly from them, so as to enter our eyes without being intermixed with others. Any person may be sensible of this by looking at a star of the first magnitude through a long narrow tube, which, though it takes in as much of the heavens as would hold a thousand such stars, it scarcely renders that one visible. The stars being so immensely distant from the earth, there seems to be but little probability of ascertaining with certainty the real magnitude of any of them.

And, as the late Sir W. Herschel has very justly remarked, "that in the classification of stars into magnitudes, there is either no natural standard, or at least none that can be satisfactory; and that the astronomers who have thus classed them have referred their size or lustre to some imaginary standard."

The same illustrious astronomer observes, "That the inconvenience arising from this unknown, or at least ill-ascertained standard, to which we are to refer, is such that all our most careful observations labor under the greatest disadvantage. If any dependence could be placed on the method of magnitudes, it would follow that many of the stars had undergone a change in their lustre, or apparent magnitude, even since the time of Dr. Flamstead. Not less that eleven stars in the constellation Leo have undergone a change of lustre since his time." This change Sir W. Herschel believes has arisen from the uncertainty of the standard of magnitudes, and not from any real change in the lustre of stars; and in order to prevent mistakes of this nature to future observers, Sir William proposes to compare the lustre of any particular star with one that is greater, and also with one that is less, both of which are to be as near the proposed star as possible. This he thinks would answer much better for detecting a change in the lustre of any suspected star, than the vague method of magnitudes, which has been hitherto in use among astronomers.

As a full display of Sir W.'s method would occupy more space than can be allotted to it in this work, those who wish to have more information on the subject may consult the Philosophical Transactions, Vol. 86.

The variation in the light of the stars has been ascribed to the interposition of the *planets* that revolve round them; but it is not probable that the planets are sufficiently large to produce any sensible effect, of this kind, at least.

Of Eclipses.—Of all the various phenomena of the heavens, there are none which have created so much curiosity, excited so much interest, or caused so great terror, throughout the world, as eclipses of the sun and moon; and to those who are unacquainted with the principles of astronomy, there is nothing, perhaps, which appears more extraordinary than the accuracy with which they can be predicted.

In the earlier ages of the world, before science had enlightened the minds of men, appearances of this kind were generally regarded as alarming deviations from the established laws of nature; and but few, even among philosophers themselves, were able to account for these extraordinary appearances. At length, when men began to apply themselves to observations, and when the motions of the celestial bodies were better understood, these phenomena were not only found to depend upon a regular cause, but to admit of a natural and easy solution. There are, however, nations that still entertain the most superstitious notions respecting eclipses, particularly the Mexicans and Chinese.

> Thus when the infant moon her circling sphere
> Wheels o'er the sun's broad disk, her shadow falls
> On earth's fair bosom; darkness chills the fields,
> And dreary night invests the face of heaven.
> Reflected from the lake, full many a star
> Glimmers with feeble languor. India's sons,
> Affrighted, in wild tumult rend the air.
> Before his idol god, with barb'rous shriek,
> The Brachman* falls: when soon the eye of day
> Darts his all-cheering radiance, from the gloom
> Emerging. Joy invades the wond'ring crowd,
> And acclamation rushes from the tongues
> Of thousands, that around their blazing pile
> Riot in antic dance and dissonant song.—[Zouch.]

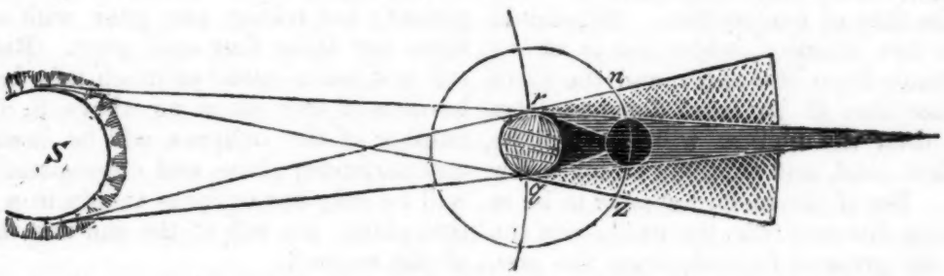
Many instances are to be found, not only in ancient, but even in comparatively modern

* Although the Chinese perform the most ridiculous and superstitious ceremonies during the time of an eclipse, yet they can calculate them with the greatest precision.

history, where the superstition of the times has continued to connect the records of eclipses with the details of some remarkable event, which either happens soon after or during their continuance. But these details being foreign to the nature of the present work, we shall proceed to give an account of the causes, and various kinds of eclipses of the sun and moon.

As every planet belonging to the solar system, both primary and secondary, derives its light from the sun, it must cast a shadow towards that part of the heavens which is opposite to the sun. This shadow is, of course, nothing but a privation of light in the space hid from the sun by the opaque body, and will always be proportionate to the relative magnitudes of the sun and planet. If the sun and planet were both of the same size, the form of the shadow cast by the planet would be that of a cylinder, the diameter of which would be the same as that of the sun or planet, and it would never converge to a point. If the planet were larger than the sun, the shadow would continue to spread or diverge; but as the sun is much larger than the greatest of the planets, the shadows cast by any one of these bodies must converge to a point, the distance of which from the planet will be proportionate to the size and distance of the planet from the sun. The magnitude of the sun is such that the shadow cast by each of the primary planets always converges to a point before it reaches any other planet, so that not one of the primary planets can eclipse another. The shadow of any planet which is accompanied by satellites may on certain occasions eclipse these satellites; but it is not long enough to eclipse any other body. The shadow of a satellite or moon may also, on certain occasions, fall on the primary and eclipse it.

Eclipses of the sun and moon happen when the moon is near her nodes, that is, when she is either in the plane of the ecliptic or very near it. Those of the sun happen only at new moon, or when the moon is in conjunction with the sun; whilst those of the moon happen at the time of *full moon*, or when the moon is in opposition to the sun. The sun, earth, and moon, must, therefore, always be nearly in the same straight line at the time of an eclipse; and conversely, when these three bodies are nearly in a straight line, an eclipse must take place. Hence it is evident, that an eclipse happens in consequence of one of the two opaque bodies, the earth and the moon, being so placed as to prevent the sun's light from falling on the other. See the following figure, which represents the moon passing through the dark shadow of the earth, as she moves in her orbit, *n z*, while the earth moves in the ecliptic, *r q*.



The interposition of the moon between the sun and the earth produces an eclipse of the sun; and the interposition of the earth between the moon and the sun, so that its shadow falls on the moon, produces an eclipse of the moon. On these principles the whole phenomena of eclipses depend, and admit of complete explanation.

If the moon's orbit were coincident with the plane of the ecliptic, the moon's shadow would fall upon the earth, and occasion a *central eclipse* of the sun at every conjunction, or new moon; whilst the earth's shadow would fall on the moon, and occasion a total eclipse of that body at every opposition, or full moon. For as the moon would then always move in the ecliptic, the centres of the sun, earth, and moon, would all be in the same straight line at both of these times. But the moon's orbit is inclined to the ecliptic, and forms with it an angle of about 5° 10′; and therefore the moon is never in the ecliptic, except when she is in one of her *nodes:* hence there may be a considerable number of conjunctions and oppositions of the sun and moon without any eclipse taking place.

The moon is always at some distance from the ecliptic, except when she is in one of her *nodes;* and this distance is called her *latitude*, which is north or south, according as the moon is on the north or south side of the ecliptic. Now, if the moon has any latitude, there cannot be a *central* eclipse, for this can only happen when the moon is in one of her nodes at the moment of con-

junction, which is very seldom the case; and, of course, very few central eclipses of the sun have taken place since the creation of the world.* But the section of the earth's shadow (through which the moon passes when she is eclipsed) being much larger than the disc of the moon, the moon may be *totally* eclipsed, although she be at some distance from her node at the time of opposition; but its duration will be the greater the nearer she is to the node. An eclipse of the *sun* may also happen, although the moon be at some distance from her node at the time of conjunction; but its form, as well as its duration, depend very much upon that distance. This circumstance has occasioned the division of eclipses into central, total, annular, and partial.

As the meaning of these terms must be obvious to the reader, it is almost unnecessary to give an explanation of them.

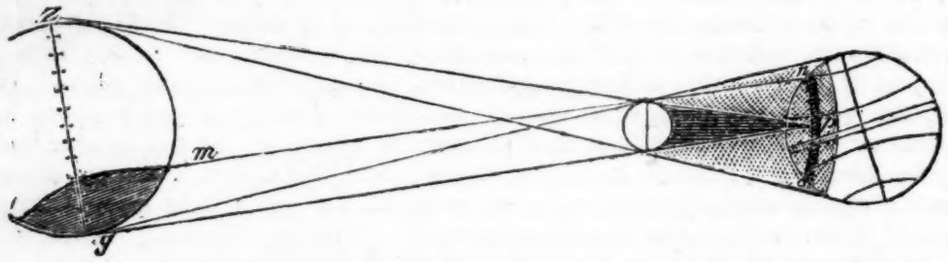
A central eclipse is that in which the centre of the shadow falls on the centre of the body which is eclipsed.

A total eclipse is the obscuration of the whole body eclipsed.

An annular eclipse is that in which the whole of the body eclipsed is hid, except a ring round its edge, which remains luminous.

A partial eclipse is that in which part of the eclipsed body is hid from view.

The following figure represents a partial eclipse of the sun, which will be visible to that tract of the earth marked *n p o*, the line *m n* marks the greatest obscuration.



If the distance be very small, the eclipse will be the greater and continue the longer; but no eclipse of the sun can be either *central* or total, except the moon be in the very node at the time of conjunction. But should she be in this situation, when she is at her least distance from the earth, and the earth at the same time at its least distance from the sun, then the eclipse will not only be central, but *total*, and continue so for a few minutes. But if the moon happens to be at her greatest distance from the earth, and the earth at its greatest distance from the sun, the eclipse will be annular, or a small space round the sun's centre only will be hid from view, and a bright lucid ring round his edge will remain visible.

If the moon be less than 17½ degrees from either node at the time of conjunction, her shadow will fall more or less upon the earth, according as she is more or less within this limit; and, of course, the sun will suffer a partial eclipse. And if she be less than 12½ degrees from either node at the time of opposition, she will pass through more or less of the earth's shadow, according as she is more or less within these lines, and of course she will suffer an eclipse.

As these limits form but a small part of the moon's orbit, which is 360 degrees, eclipses happen but seldom; however, in no year can there be fewer than two, and there may be seven of the sun and moon together; but taking one year with another, there are about four each year. But as the sun and moon spend as much time below the horizon of any place as above it, half the number of the eclipses will be *invisible* at any particular place, and consequently there will be only *two* eclipses visible in a year at that place: the one of the sun and the other of the moon.*

Every eclipse, whether of the sun or moon, is visible at some place of the earth's surface, and invisible at others; for the rational horizon of every place divides both the earth and heavens into two equal portions or hemispheres; and as no celestial body can be seen except it be above the spectator's horizon, it follows that any eclipse which is visible in one hemisphere cannot be visible in the other, because the body which is eclipsed is below the horizon of that other. If a lunar eclipse, for example, happens at any hour of the night, between the time of sun-setting and sun-rising, at any particular place, it will be visible there and invisible to the inhabitants of the opposite hemisphere, who have the sun

* One of the most remarkable eclipses of this kind which has ever happened was visible in Britain and several other countries, on the 7th of September, 1820.

* If there be seven eclipses in any year, five of them must be of the sun and two of the moon.

above their horizon at that time; for the sun and moon are in opposite parts of the heavens at the time of a lunar eclipse. And with respect to solar eclipses, it is evident that they can only be seen at any place when the sun is above the horizon of that place. There is, however, a difference with regard to the visibility of a solar and lunar eclipse; for an eclipse of the moon has the same appearance to all the inhabitants of that hemisphere to which the moon is visible at the time, owing in part to the small distance of the moon from the earth. But an eclipse of the sun may be visible to some places and invisible to others in the same hemisphere of the earth, because the moon's shadow is small in comparison of the earth; for its breadth, excluding the penumbra, is only about 180 miles, even in central eclipses.* Hence, those places which are considerably distant from the path of the shadow will either have no eclipse at all, or a very small one; while places near the middle of the shadow will have the greatest possible. There is also a difference in the absolute time at which a solar eclipse happens at the various places where it is visible; for it appears more early to the western parts, and later to the eastern, on account of the motion of the moon (and of course her shadow) from west to east.

In most solar eclipses the moon's disc may be observed by a telescope to be covered by a faint light, which is attributed to the reflection of light from the illuminated part of the earth. When the eclipses are total, the moon's limb is surrounded by a pale circle of light, which some astronomers consider as an indication of a lunar atmosphere, but others, as occasioned by the atmosphere of the sun, because it has been observed to move equally with the sun, and not with the moon.

Dr. Halley, in describing a central eclipse of the sun, which happened at London in April, 1715, says, that although the disc of the sun was wholly covered by the moon, a luminous ring of a faint pearly light surrounded the body of the moon the whole time, and its breadth was nearly a tenth of the moon's diameter.

In lunar eclipses, the moon seldom disappears entirely; and on some occasions even the spots may be distinguished through the shade; but this can only be the case when the moon is at her greatest distance from the earth at the time of the eclipse, for the nearer the moon is to the earth the darkness is the greater. In some instances the moon has disappeared entirely; and the celebrated astronomer, Heraclius, has taken notice of one where the moon could not be seen even with a telescope, though the night was remarkably clear.

Although eclipses of the sun and moon were long considered by the ignorant and superstitious as presages of *evil*, yet they are of the greatest use in astronomy, and may be employed to improve some of the most important and useful of the sciences. By eclipses of the moon the *earth* is proved to be of a *globular* form, the sun to be *greater* than the *earth*, and the *earth* greater than the *moon*. When they are similar in all their circumstances, and happen at considerable intervals of time, they also serve to ascertain the real period of the moon's motion. In geography, eclipses are of considerable use in determining the longitude of places, and particularly eclipses of the moon, because they are oftener visible than those of the sun, and the same eclipse is of equal magnitude and duration at all places where it is seen. In chronology, both solar and lunar eclipses serve to determine exactly the time of any past event.

For the purpose of finding the longitude at places on the earth, eclipses of Jupiter's satellites are found much more useful than eclipses of the moon; not only on account of their happening more frequently, but on account of their instantaneous commencement and termination.

When Jupiter and any of his satellites are in a line with the sun, and Jupiter between the satellite and the sun, it disappears, being then eclipsed, or involved in his shadow. When the satellite goes behind the body of Jupiter, with respect to a spectator on the earth, it is said to be *occulted*, being hid from our sight by his body, whether in his shadow or not. And when the satellite comes into a position between Jupiter and the sun, it casts a shadow on the face of that planet, which is seen by a spectator on the earth as an obscure round spot. Lastly, when the satellite is in a line with Jupiter and the earth, it appears on his disc as a round black spot, which is termed a transit of the satellite.

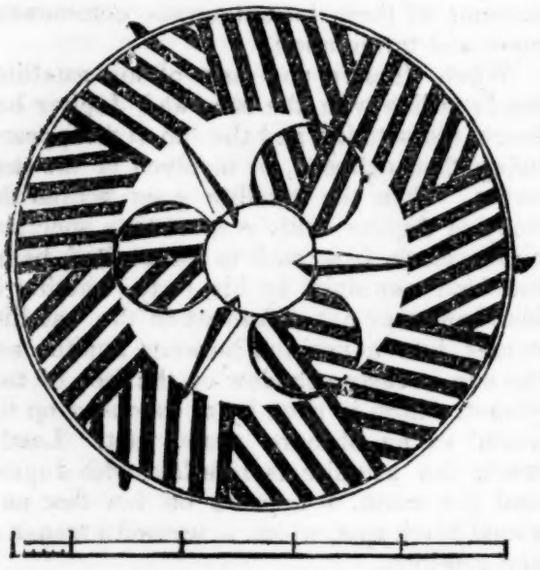
As those phenomena appear at the same moment of *absolute* time at all places on the earth to which Jupiter is then visible, but at different hours of *relative* time,* according to the distance between the meridian of the places at which observations are made, it

* A penumbra is the faint shadow produced by an opaque body when opposed to a luminous one.

* *Absolute* time is that which is computed from the same moment; *relative* is that which is computed from different moments.

follows that this difference of time converted into degrees will be the difference of longitude between those places. Suppose, for example, that a person at London observed an eclipse to begin at 11 o'clock in the evening, and that a person at Barbadoes observed the same at 7 o'clock in the evening, it is certain the eclipse was seen by both persons at the same moment of absolute time, although there is four hours difference in their manner of reckoning that time; and this converted into degrees (at the rate of 15 degrees to an hour) is the difference of longitude between these two places; therefore, Barbadoes is 60 degrees *west* from London, the time not being so far advanced there as at London.

Another phenomenon, somewhat similar to an eclipse, sometimes takes place, by which the longitude of places may be determined, although not quite so easily, nor perhaps so accurately, as by the eclipses of Jupiter's satellites. This is the hiding or obscuring of a fixed star or planet by the moon or other planet, which takes place when the moon or planet is in conjunction with the star. Appearances of this kind are termed occultations. They are very little attended to except by practical astronomers, who employ them for the correction of the lunar tables, and settling the longitude of places, as already stated.



Great Improvement in Mill Stones.—The accompanying drawing represents an improvement in mill stones, which, from the following certificates, would seem to be of very great importance. It consists principally in letting in the air, as is denoted in the drawing, on the flour while grinding, and in expediting the operation. The patentee, James Preslow, and the original purchaser, George B. Jeffery, reside at Auburn.

Auburn, March 18, 1833.

We, the subscribers, having examined the plan for which James Preslow has obtained a patent for the discovery of an improvement of preparing mill stones to expedite the grinding of grain, and also seen an experiment of the grinding of grain at the mills of Carhart and Polhemus, in the village of Auburn, with mill stones prepared and dressed according to the improvement for which said patent is obtained, do hereby certify that we were present at said mills, and saw fifteen and a half bushels of wheat ground with one run of stones in a superior manner, for flour, within the space of one hour.

Ambrose Cock,
I. S. Miller.
E. Miller.

Manlies, May 18, 1833.

We, the subscribers, having had our plaster mill stones dressed by Mr. James Preslow, according to his method of dressing, and from the experiment do believe it to be the greatest improvement that has ever been offered to the public, feel bound to say in this certificate, that by the experiment tried, our mill ground twice the quantity in the same given time, and equally fine. And we believe that in dressing plaster mill stones according to said Preslow's method, that the quantity can be quite or nearly doubled: we therefore cordially recommend it to the patronage of the public.

Jacob R. De Prey,
James I. D'Elery.

Milford, June 4, 1833.

Fifty-two bushels and a half in four hours and forty-nine minutes, the flour very good. We have no hesitation in recommending the improvement, from our own experiment as well as from the science and respectability of the gentlemen engaged in the improvement.

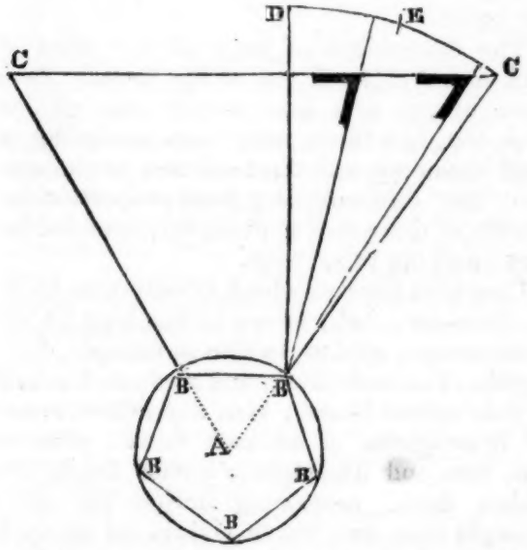
Disborough & Ludlow.

Application may be made to Mrs. White, corner of Beekman and Pearl streets, New-York.

On the Construction of Hatters' Planks. By Erastus Stanley. To the Editor of the Mechanics' Magazine.

Sir,—Some twelve years since, Mr. Joseph Bull, of this village, was in want of two sets of hatters' planks made, and having been at great expense heretofore in getting them made, it being a difficult piece of work for those that are not acquainted with making them, it frequently being the case that the stock is so much wasted as to make it very expensive, he suggested that there might be a rule devised whereby the stock might be cut to better advantage than heretofore. I, therefore, being a mechanic, commenced studying on the subject, and after some days I devised the following rule, from which I

have made several sets in less than one-third of the time usually occupied in making them, besides a saving of one-fourth of the stock.



Draw a circle two inches in diameter larger than the outside of the kettle, A. Divide it into five parts, as B B B B B. Draw lines from the centre through B as far out as the width of the plank, as B C; then draw a line from B perpendicularly to D; then set one foot of the compasses at B, and extend the other to C, and draw the curve C D. Divide C D into forty-five parts: divide C D into two equal parts, E for eight and a half inches rise; set off two and one-eighth parts from C towards E, and draw a line to B, which line, and the line C C, gives the bevel for the end of the plank B C; then set off four and one-fourth parts from E, towards D, and draw a line to B, which line and the line C C gives the bevel for the edge of the plank.

N. B.—The under side is the work side, and the upper edge is the work edge of the plank.

I have not made this invention known, in hopes of being benefitted by it, but it being my fortune not to make any thing by speculation, I have concluded to communicate it (if you think it worthy a place) to the public through your Magazine. Yours, &c.,

ERASTUS STANLEY.

Canandaigua, April 30, 1834.

Specification of a Patent for an Improvement in Wheels for Cars and Locomotive Engines, to be used upon Railroads. Granted to ROSS WINANS, *Civil Engineer, city of Baltimore, November* 19, 1833.

To all whom it may concern, be it known that I, Ross Winans, of the city of Baltimore, in the state of Maryland, Civil Engineer, have invented an improved mode of constructing wheels for cars and locomotive engines, to be used upon railroads, and that the following is a full and exact description thereof.

The more clearly to exhibit the difference between my improved wheel and those which have been heretofore employed, I will briefly point out the manner in which wheels for this purpose have been most commonly made; not intending, however, as it is not necessary for the purpose in view, to notice all the plans which have been adopted.

1st. Such wheels have been made wholly, or nearly so, of cast iron; the face, or tread of them, being cast within a *chill*, consisting of a thick rim, or hoop, of iron, which forms a part of the mould.

2d. The wheels have been cast without being chilled, and afterwards hooped with wrought iron, which then forms the face and flanch of the wheel.

3d. A cast iron nave, or hub, has been made to receive wooden spokes, inserted in wooden felloes, which were hooped with a tire of wrought iron.

4th. The hubs have been of cast iron, with spokes of wrought iron, and a rim of wrought or of cast iron, hooped with wrought iron.

These plans have each their respective advantages and disadvantages, but neither of them has fully answered the purpose for which it has been adopted; the wrought iron hoop, or tire, upon the cast iron rims have gradually become loosened; the wooden spokes and felloes have pressed the one into the other, and the tire has ceased to bind them, an evil which wedging will not cure. To remedy these defects, and others incident to some of the wheels, is the object of my improvement.

My wheel consists essentially of three parts, namely, an *interior wheel*, the hub, spokes, and rim of which are of cast iron; a *rim of wood*, formed in a way to be presently described, surrounding the cast iron wheel; a *hoop or tire of wrought iron*, surrounding the wood, and forming the face, or tread, of the wheel.

The inner wheel is made, in some respects, like those first noticed, but the face is not chilled, nor has it the same form with the chilled face. It should be made of the same width on the rim, with the wrought iron tire which is to surround and form the tread of the wheel, say five inches. The face of the cast rim may be cylindrical for the greater part of its width, but it must in this case have a fillet, or edge, projecting up on each side of it, say to the height, and of the thickness, of half an inch, which will then give to it the

appearance of a wheel with a double flanch, having a cylindrical tread of four inches in width. Instead of making the face in this form, I intend sometimes to give to it a regular declination from each edge towards the centre. A section of the rim, transversely, would then be somewhat in the form of the letter V, but with the angle obtuse. The inclination will be sufficient if the diameter at the centre of the rim is one inch less than that at the sides, or edges. Other forms may be given to the face of the rim, by which the object in view may be attained, namely, that of retaining the wooden rim in its place, without its allowing it to move out on either side.

A rim of wood is to be placed around this wheel, which may consist of any convenient number of pieces, fitted to each other, and to the face of the wheel. The grain of the wood is to cross the rim of the wheel, running parallel with its axis. These pieces may be fitted to the face of the wheel with greater facility by driving them into a large hoop, running as a chuck in a lathe, by which means they may be turned to the form required; they may then be fastened on to the rim by wood screws, or otherwise, and turned thereon to receive the iron hoop or tire. The best thickness of this rim will be from two to four inches.

The *hoop, or tire, of wrought iron*, is to be made in the usual form, turned truly, and passed on over the wooden rim when expanded by heating it as highly as may be done without burning the wood. Bolts are then to be passed through the wrought iron, the wood, and the cast iron rims, which are secured by nuts, to confine the whole together.

The hub, or nave, in a wheel thus made, may be cast entire, instead of having those divisions, or openings, which are necessary in the chilled wheel, to allow for contraction. Although I have described the spokes and rim as being of cast iron, either or both of them may be of wrought iron, but it would be more costly, without affording any adequate advantages; those of cast iron being perfectly safe in this mode of construction.

It will be readily perceived that the wood, thus pressed between two hoops of iron, has an extent of bearing surface which will effectually prevent its being condensed by the force to which it is subjected; whilst, by its elasticity, it will tend to preserve both the road and the vehicles passing over it. If perfectly dried when put on, which may be done by artificial heat, the wood will never shrink, but, on the contrary, will expand, and render all the parts the more firm. Such a wheel will have less tendency than any other, where wood is employed, to get out of truth; and should wedging become necessary, it may be done more effectually than with any other.

The dimensions of most of the parts of such a wheel need not differ greatly from those of the cast iron wheels with chilled rims, but, like them, must vary according to their diameter, and the load they are to sustain; the following is a good proportion for wheels of three feet in diameter, intended for cars carrying three tons.

Cast iron interior wheel, twenty-nine inches diameter; hub, seven inches long by six in diameter; spokes, twelve in number, five-eighths of an inch thick, and three and a half or four inches broad; rim, five inches broad by five-eighths of an inch thick; wooden rim, two and five-eighths inches thick, five inches deep, measuring across the rim; wrought iron tire, seven-eighths of an inch thick, five inches broad; flanch, one and one-fourth inch deep, one inch thick.

Although I have described the rim of wood as placed with its grain crossing the rim of the wheel, and am fully convinced that this is the best manner of placing it, yet it will answer the purpose, to a considerable extent, when running in the direction of the rim, and I do not intend, therefore, to limit myself in this respect, as what I claim as my invention is the interposing a rim or belt of wood between an interior wheel of cast or of wrought iron, and a wrought iron rim or tire, and securing the whole together in the manner and for the purposes hereinbefore set forth.

Ross Winans.

Newly Invented Railways. Communicated by the Inventor. To the Editor, &c.

Dear Sir,—I have now finished planting trees, for the present season at least, and snatch the first moment's time to fulfil the promise I have made you respecting my newly invented railways. I now give you a description, though an imperfect one, of this notable contrivance.

The supports of the railways are constructed out of common dock logs, which, in the first instance, are to be subjected to the operation of being well charred. Their butt ends are then to be inserted in the ground three or four feet deep, and surrounded by ruple stones well rammed in. The height of these supports will depend upon circumstances, from one hundred feet high down to not less than ten.

In order to give to these supports a due degree of stiffness and strength, I propose making the ways double, which will afford sufficient room to give them these properties. The spaces longitudinally between these supports, according to circumstances, may be occasionally extended to 500 feet, perhaps to a thousand. Whenever the extension is considerable, a suf-

ficient number of lighter supports may be used. These may probably be made to give the necessary support without being inserted in the ground.

I shall now proceed to describe the mode of constructing the rails. In the first place, round iron, from a quarter to a half an inch in thickness, must be stretched across from pillar to pillar. These iron rods must be placed immediately under the rails—three to each rail. On these the rails are formed of common plank, extending the whole length, placed one on the top of the other, breaking joints. The whole number of the plank thus layed will depend on circumstances, perhaps 8 or 10 may prove sufficient. A proper cement must be used between each layer of the plank, to connect the whole into one solid mass. When the rails are thus formed, a shoeing of some species of hard wood must be laid on, for the wheels to run on. These wheels must be tired with hard wood instead of iron. It is contemplated that, thus elevated above the dust and mud of common roads, they will last a long time.

The expense of a rail constructed as above would be small indeed when compared with the railroads now in use. It probably would not cost one-fourth of the latter, where iron is universally in use. But, independently of the difference of expense in the construction, as well as in the reparation of such a road, the advantages to be derived from its use are numerous and important. Its elevation not only protects it from dust, &c., but places it out of the reach of all interruptions, and permits also the passage across its path below of all sorts of other carriages in all directions. The farmer, instead of his usual dread of a railroad across his premises, will, on the contrary, court the approach of such a railroad as above described, as a great convenience in his various transportations, without incommoding him in any way. Whilst the railroad is passing over his head, he pursues his different agricultural avocations on the surface of the ground uninterruptedly. The room the supports occupy is too trivial to be noticed; but another most important circumstance is, that it completely does away with all necessity of embankments and deep cuttings, leaving the ordinary surface of the ground free and clear; and, should the undulating project prove really advantageous, it would enjoy all the benefits arising from that source, exempted from all extra expense.

But there is one source of improvement which had nearly escaped my memory. The forward wheels, perhaps all the wheels, should have attached to each of them a wheel of a foot or 18 inches diameter, revolving horizontally, so placed that its periphery shall approach the inner side of the rails within half an inch, when the carriage is passing through the middle of the road, so as to prevent much deviation therefrom whenever the wheels come in contact with either side of the rails. The mode now in use of preventing the carriage wheels from running off the ways is clumsy, and attended with much friction, so as to occasion considerable wear and tear. In order to prevent the carriage wheels from slipping on the ways, the periphery thereof should be covered with Indian rubber or leather made perfectly water tight.

Your obedient servant, J. S.

Hoboken, May 10, 1834.

Railroad from Tuskaloosa to Tuscumbia. To the Editor of the American Railroad Journal and Advocate of Internal Improvements.

North Port, Ala., April 25, 1834.

Sir,—Sometime in the fall of 1832, No. 36 of the Railroad Journal came into my hands. I am not absolutely certain that it is still published in New-York, though I am informed that it is. My object in writing at this time is to request you to send me a Number of the Journal, if it is still published. On the receipt of it I will transmit to you the subscription price of one copy for one year, and perhaps more. The reason for my wishing to subscribe for the Railroad Journal is, that through the medium of it, to give publicity to the designs and wishes of so many of the people of this State who are anxious for a railroad between Tuskaloosa and Tuscumbia, a distance of about 100 miles, or a little over. It is not my intention to dilate on this subject at this time. It is sufficient, for the present, to mention, briefly, that in the event of the existence of this road, 100,000 bales of cotton, now raised in *Tennessee valley*, could get to market in going one-third the distance they are now carried. The goods taken in exchange would return on the same road. There would then be a direct communication, by means of the Tennessee river, which runs nearly north from Tuscumbia into the Ohio, from Cincinnati and the immense country of the West, to Mobile, consequently, all the rope, bagging, twine, flour, bacon, potatoes, whiskey, and a variety of other articles, that now go the long route to New-Orleans, Mobile, and thence up our rivers, would come down the railroad to Tuskaloosa, and through the middle of Alabama to Mobile. The goods taken in exchange would return back on the road. Flour, bacon, and potatoes, on account of the delay in going to New-Orleans, and the hot weather, are frequently spoiled before arriving here. The great north and south travel is another important consideration; and also that the country through which this road would pass abounds in *stone coal*. Tuskaloosa is at the head of navigation, on the Black Warrior river. North Port is opposite the town of Tuskaloosa, on the other side of the river, and ships between 3 and 4000 bales of cotton annually.

Very respectfully, C. S.

A railroad from the Tuscumbia and Decatur Railroad to Tuskaloosa will add greatly to the facilities and conveniences of business men in the interior of Alabama. We consider the projectors of the Tuscumbia, Courtland, and Decatur Railroad among the true benefactors of the State. *That road*, short as it is, *will become the centre of action*. It will, within a few years, be continued to the Atlantic on

the east, the Mississippi on the west, the gulf of Mexico on the south, and the Ohio on the north; and will be intersected by numerous other shorter railroads from all the principal towns in their vicinity.

RAILROAD FROM MEMPHIS TO BOLIVAR.—Extract of a letter, dated "Memphis, Tenn., April 22, 1834," addressed to the Editor of the Railroad Journal, &c.

"SIR,—I am now engaged in the preliminary survey of a railroad from Memphis, through Summerville, to Bolivar. It is intended to connect this with Jackson, and thence to Columbia, and thence probably to Nashville. Probably, in a few years, Nashville will be connected to Louisville on the Ohio River. Casting your eye on a map of Tennessee and Kentucky, you will see the extent of such a railroad. We strongly anticipate a connection with Charleston via Tuscumbia. Numbers in this place wish to take your Journal. I hope to send you something more substantial than words when next I write.

"Very respectfully, JOHN THOMPSON."

The writer of the above has our best wishes for his success, as well in his survey as in obtaining subscribers to the Journal.

FORCE OF TRACTION.—Experiments uniformly show that the force of traction is, in every case, nearly in an exact proportion to the strength and hardness of a road. The following are the results: On a well made pavement, the power required to draw a waggon is 33 lbs.; on a road made with six inches of broken stone of great hardness, laid on a foundation of large stones, set in the form of a pavement, is 46 lbs.; on a road made with a thick coating of broken stone, laid on earth, the power required is 65 lbs.; and on a road made with a thick coating of gravel, laid on earth, the power required is 147 lbs. Thus it appears that the results of actual experiments fully correspond with those deduced from the laws of science."—[Parnell's Treatise on Roads.]

A PREVENTION FOR DRY ROT.—It has been discovered by experiment, that dry rot in oak can be prevented by a simple process, and at a moderate expense. It consists in steeping the timber in a vat prepared for the purpose, with bark, in a mode similar to that used in tanning. The time required to accomplish this object varies from two to three months, when the timber becomes saturated with the bark, and its durability and antiseptic powers are rendered such as to be capable of resisting decomposition for an indefinite period. The wood ought previously to be formed into the shape in which it is intended to be used. This system is not only much safer as regards health, and more economical and convenient in its application than that in which corrosive sublimate is used, but a comparative trial will prove the remedy proposed more effective in its operation and certain in its results.

STATISTICS OF FRENCH MANUFACTURES.—The principal manufactures of France may be dated from the reign of Louis XIV., whose minister, the celebrated Colbert, invited foreign artists and artisans of every kind and of distinguished merit into the kingdom, and encouraged them by premiums to fix their establishments in France. But towards the end of his reign, that monarch, by his revocation of the Edicts of Nantes, and his persecution of the Protestants, in a great measure destroyed the advantages arising from the foreign establishments, by forcing thousands of artisans to seek refuge in England, and the Low Countries, into which they introduced those branches of industry, especially silk. Thus France lost the services of some of her most ingenious mechanics through the folly of an infatuated monarch.

To give an idea of the manufactories of France, it is sufficient to cite the draperies of Louviers, Sedan, Elbeuf, Castres; the cambrics of Valenciennes and Cambray; the pier-glasses of St. Gobain, whose dimensions are occasionally ten feet in height by four and five feet broad; the cotton manufactories of St. Quentin, Rouen, &c. &c.; the linens of Brittany, Dauphiny, and the northern provinces; the laces of Lille, Alencon, Valenciennes, and Puy; the silks of Lyons, Avignon, Nimes, and Tours; the tapestries of the Gobelins, at Paris; the carpets of La Savonnerie and Aubusson, which, in beauty of design and brilliancy of colors, rival those of the east; the porcelain of Sevres, her manufactories of clocks and watches, jewellery, crystal, mock diamonds, bronzes, fire arms, &c. To these might be added an immense number of manufactories which were wholly unknown in France half a century ago, such as files, needles, woolcards, &c.

We have learned from official sources, that the capital employed in manufactures amounts to 1,820,105,409 fr., which is applied as follows:

In indigenous materials,	416,000,000 fr.
In materials imported,	186,000,000
In wages, - - -	844,000,000
In general expenses, as wear and tear of machinery and tools, repairs, fuel, lights, interest of money, invested as fixed capital, which being deducted from the gross amount leaves 182,105,409 francs for the profit of the manufacturers, -	192,000,000

The annual produce of the principal

branches of industry in 1828 has been calculated in round numbers as follows:

Thrown silks, silk stuffs, gauzes and crapes, -	160,000,000 fr.
Cloths and woollen stuffs,	250,000,000
Linen drapery and thread lace	210,000,000
Stationary, - - -	25,000,000
Cotton, - - -	200,000,000
Lace, - - - -	10,000,000
Hardware, - - -	125,000,000
Coal, and other produce of mines and quarries, -	30,000,000
Watches and clocks, -	30,000,000
Gold and silver articles,	50,000,000
Jewellery, - - -	40,000,000
Glass, plate glass, china, pottery, bricks, - -	80,000,000
Lime and plaster, - -	15,000,000
Salts and acids, - -	30,000,000
Soap, - - - -	30,000,000
Refined sugar, - -	15,000,000
Hats, - - - -	30,000,000
Leather, - - -	160,000,000
Dye and varnish, - -	50,000,000
Perfumery, - - -	15,000,000
Books, - - - -	30,000,000
Beer, - - - -	60,000,000
Cider and perry, - -	50,000,000
Brandy, - - -	75,000,000
Upholstery and musical instruments, - - -	50,000,000
Total,	1,820,000,000 fr.

Having enumerated the principal manufactures in France, we shall state from official information the progress made in the productions of those manufactories from 1812 to 1827. In the first place, we find that under the government of the empire, when Belgium and the left bank of the Rhine were under her dominion, France in 1812 employed in her manufactories 35 millions kilogrammes, or 70 million pounds of native wool. In 1816 the quantity of native wool, with the amount imported of foreign wool, for fine cloths, merinos, and cachemires, &c. was in the whole 80 million French pounds, which, with the difference of nearly ten per cent., is equal to 90 million lbs. English. In 1824 and 1826 the quantity of wool used in the manufactories amounted to 48 millions of kilogrammes, making an increase in the consumption of wool in 14 years of 26 millions of French pounds, or more than one million English tons.

In 1812, the quantity of cotton spun into thread did not exceed 10,362,000 kilogrammes. The consumption in 1816 amounted to 12 millions of kilogrammes; in 1825, the quantity manufactured was 26 millions; in 1826, 32 million kilogrammes of cotton employed in prints, calicoes, tulles, &c.: thus the consumption has been more than tripled in 14 years. The consumption of silk has not less increased in proportion to wool and cotton. In 1816, France imported 400,000 kilogrammes of silk; in 1824 and 1825, 650,000 kilogrammes; and in 1826, not less than 800,000 kilogrammes, notwithstanding the progress made and encouragement given to breeding of silk worms in the country. In 1816, the quantity of coals extracted from the mines did not exceed 1000 million kilogrammes; in 1826, they furnished 1500 million kilogrammes. In 1814 and 1816, the quantity of iron manufactured amounted to 100 millions, and in 1825 and 1826, it had increased to 160 millions of kilogrammes.—[Goldsmith's Statistics of France, and Rep. Pat. Inv.]

Sponge.—This well known marine production has been in use from very early times, and naturalists were long embarrassed whether to assign it a place in the animal or vegetable kingdom. Most authorities now agree in putting the sponges in the lowest scale of animal life. There are about fifty different species of sponges, of which nine or ten belong to this country. They are found in the Mediterranean and those seas in warm and temperate latitudes, diminishing in number and becoming of inferior quality on the approach to cold regions. They adhere to rocks in places the least exposed to the action of currents and waves, which the ebbing tide does not leave uncovered. The best sponges known to us are those which come from the Archipelago, where they abound near many of the islands, whose inhabitants may be said to subsist by the sponge-fishery, if we may so call it. At the Cyclades, for instance, sponge-diving forms the chief employment of the population. The sea is at all times extremely clear, and the experienced divers are capable of distinguishing from the surface the points to which the sponge is attached below, when an unpractised eye could but dimly discern the bottom. Each boat is furnished with a large stone attached to a rope, and this the diver seizes in his hand on plunging head foremost from the stern. He does this in order to increase the velocity of his descent; thus economizing his stock of breath, as well as to facilitate his ascent when exhausted at the bottom, being then quickly hauled up by his companions. Few men can remain longer than about two minutes below; and, as the process of detaching the sponge is very tedious, three, and sometimes four divers de-

scend successively to secure a particularly fine specimen.

The best sponge is that which is the palest and lightest, has small holes, and is soft to the touch. By the old physicians, sponge was regarded as a cure for a long list of maladies; this last is now much abridged, though burned sponge, in which form only it is used, still has a place in the materia medica.—[Penny Magazine.]

INDIAN RUBBER WATER-PROOF.—This substance is every day becoming of increasing importance. For harness and various other farming and domestic purposes, it will at no distant day be used. The following is from the Ohio State Journal:

Having heard much said of late in favor of Jewitt's water-proof, as rendering leather perfectly tight, I witnessed an experiment on Saturday last, showing the improvement of the leather as to its durability; and were there not a number of the most respectable citizens present, I should hesitate to state the fact and publish it to the world. Two pieces of leather, of equal thickness, were tried upon a grindstone, under a pressure of a weight of 12 lbs. In the first place, the leather in its natural state was placed upon the stone, which was revolved 1500 times; then the piece saturated underwent the same operation 3000 times; and when compared, it was found not to be so much worn as the leather in its original state. From the test made, I have no hesitation in giving it as my opinion, that leather thus prepared will last twice as long as that in its original state. When it is considered that in addition to its rendering leather perfectly impervious to water, it adds 100 per cent. to the wear, its value to the American people is almost incalculable.

P. H. OLMSTED.

Columbus, March 18, 1834.

From the Eclectic Journal we extract the following:

In our former notices of this valuable article, we omitted mentioning particularly its beneficial applicability to all kinds of leather harness. It could not fail to have been observed by every individual who has had the opportunity, that those parts of harness composed of leather are, in general, injured infinitely more by wetting and drying, both by rain and sweating of the horse, than by friction or actual wear. By wetting and drying, the leather becomes hard and unpliant, in which condition it cracks and breaks. But let the harness be saturated with the water-proof, and neither water nor sweat can penetrate it, and the leather must remain as soft and pliable after exposure to wet as before. This will certainly render the harness more durable, as well as less liable to chafe or gall the horse.

In conclusion, we will repeat the suggestions of Col. Jewitt, that his composition will be equally as applicable to wood as leather, and by excluding the water from its pores, vastly increase its durability. If future experiment confirms this suggestion, as we have strong reason to hope it will, the advantages which hydraulics, and particularly the shipping interest, will receive from this discovery, will be incalculable.

CHINESE MODE OF COMPUTING.—The Chinese method of computing is by a kind of abacus, which they call a *Swampwan*, "counting-board." It consists of a frame of wood, of various sizes, divided into two unequal compartments, by a bar placed crosswise, at about one-third the length from the top. Through this bar, at right angles, are inserted a number of parallel wires, and on each wire, on the lower compartment, are five moveable balls, and in the upper two. These wires may be considered as the ascending and descending powers of a numeration table, proceeding in decimal proportions; so that if a ball on any of the wires in the larger compartment be placed against the middle bar, and called unity or one, a ball on the next wire above it will represent ten, and one on the next one hundred; so also a ball on the next lower, one hundredth; and the balls on the corresponding wires in the smaller compartment will, in the same manner, represent five, fifty, five hundred,—five tenths, five hundredths, &c. the value or power of each of those in the smaller division being always five times as much as those in the larger. In China almost every trade has a distinct system of secret numbers, that is, instead of using the proper characters for designating prices, they adopt other characters, by which they arbitrarily express their meaning, so as to be understood only by persons of the same trade.—[Martin's History of the British Colonies, Vol. I., Asia.]

THE CHINESE WALL.—According to a statement in the "Morgenblatt," the celebrated Chinese wall was erected 213 years before the birth of Christ, against the Mongolese. It is 714 German miles long, 14 feet thick, and 26 feet high; so that with the same materials, a wall, one foot in thickness and 23 in height, might be carried twice round the whole world.

A fossil ship containing sculls and bones, both human and brute, has recently been discovered at New Romney, on the coast of England. The earth has been removed so as to display her whole form, a clinker built craft, and tunnel fastened, having only one mast, being 54 feet long by 24 wide. Curiosity has been much excited by its development.

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